

Appl. No. : 10/681,456
Filed : October 7, 2003

AMENDMENTS TO THE SPECIFICATION

Please amend Paragraph [0016] of the specification as follows:

[0016] FIGURES 7A and 7B ~~is are a~~ schematic diagrams of gas flow to and from the adsorbent bed column of Figure 6;

Please amend Paragraph [0031] of the specification as follows:

[0031] As also shown in Figure 1, the compressor assembly 106 includes a compressor 114 and ~~an~~ heat exchanger 116. The compressor 114 is preferably a non-reciprocating compressor, more preferably a scroll compressor described in U.S. Patent Nos. 5,759,020 and 5,632,612, which are hereby incorporated by reference in their entirety. It is generally understood that a scroll compressor operates by moving a plate such that it orbits in a single plane relative to a fixed plate. Thus, the use of a scroll compressor advantageously eliminates reciprocating motion that tends to generate the excessive noise and vibration associated with many conventional piston compressors. In one embodiment, the scroll compressor 114 delivers an air flow of between about 4 to 9 slpm at a pressure of about 35 psia, while generating a noise level of less than about 35 dB external to the compressor. The scroll compressor 114 does not require lubricating oil and thus operates in a substantially oil-free environment, which advantageously reduces the likelihood of introducing oil contaminants into the compressed air. As Figure 1 further shows, the compressor 114 works in conjunction with the heat exchanger 116 to provide cooled feed gas to the PSA unit 108. In one embodiment, the heat exchanger 116 has a large thermally conductive surface that is in direct contact with the air stream produced by the fan 112 such that pressurized air traveling through the heat exchanger 116 can be cooled to a temperature close to ambient prior to being supplied to the PSA unit 108.

Please amend Paragraph [0034] of the specification as follows:

[0034] The PSA cycle described above advantageously includes one or more pressure equalization steps (steps 1 and 4) in which already pressurized product gas is released from one adsorbent bed to provide initial pressurization for another adsorbent bed until the two beds have reached substantially the same pressure. The pressure equalization step leads to increased product recovery and lower power consumption because it captures the expansion energy in the product gas and uses it to pressurize other adsorbent beds, which in turn reduces the amount of power and feed gas required to pressurize each bed. In one embodiment, the two-bed PSA unit

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shown in Figure 1 operating in accordance with the above-described six-step/two-bed PSA cycle is capable of producing oxygen having a purity of at least about 87%, preferably between about 87%-93%, with greater than about 31% recovery of oxygen from feed gas, more preferably greater than about 38% recovery. In operation, the valves 120a-j of the PSA unit 108 are controlled in a known manner to open and close for predetermined time periods in accordance with the above described PSA steps. Additionally, the valves 120a-j are preferably positioned upstream of the air stream produced by the fan 112 across the compressor assembly 106 so as to not to expose the valves 120a-j to portions of the air stream that are heated by the compressor assembly 106. In other embodiments, the system may utilize a vacuum swing adsorption (VSA) unit or a vacuum-pressure swing adsorption (VPSA) unit to produce the oxygen rich product gas.

Please amend Paragraph [0052] of the specification as follows:

[0052] In one embodiment, the water trap 902 is configured as a recess in the lower plate 804 of the manifold 512, extending downwardly from a section of the feed gas pathway 904 located in the upper plate 802. The water trap 902 is positioned at a lower elevation relative to the feed gas pathway 904 so as to substantially prevent trapped water ~~908~~ 906 from re-entering the feed gas pathway 904. In certain embodiments, a baffle 912 is positioned in the feed gas pathway 904 to divert the feed gas flow downwardly into the water trap 902 so that the gas is required to rise upwardly to return to the feed gas pathway 904, which substantially prevents any condensed water from being carried past the water trap by the feed gas flow. As also shown in Figure 9, the water trap 902 is in line with the waste gas pathway 910 located in the lower plate 804 of the manifold ~~504~~ 512 so that the water trap 902 can be purged by waste gas flowing through the pathway 910. In one embodiment, the water trap 902 is located in the center of a three way junction formed by the airflow passages to and from the feed valve, the exhaust valve, and the connection to the top of the column.

Please amend Paragraph [0055] of the specification as follows:

[0055] As shown in Figure 10, the piloted valve system 1000 generally includes a solenoid valve 1002, an air chamber 1004 in fluid communication with the solenoid valve 1002, and a piloted valve ~~1006~~ 1007 that can be actuated by the solenoid valve 1002 through the air chamber 1004. The piloted valve ~~1006~~ 1007 preferably comprises a diaphragm 1006 positioned between the air chamber 1004 and a waste gas pathway 1008. Pressure differences between the

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air chamber 1004 and the waste gas pathway 1008 mechanically deflect the diaphragm 1006 to open or close the waste gas pathway 1008 to gas flow. Preferably, the diaphragm 1006 has a natural resiliency such that it is deflected away from the waste gas pathway 1008 when the air chamber 1004 is not pressurized.

Please amend Paragraph [0057] of the specification as follows:

[0057] As also shown in Figure 10, the waste gas pathway 1008 is formed in the lower plate 804 of the manifold and in contact with the diaphragm 1006 through an opening 1022 formed in the inner face 808 of the upper plate 802. To close the waste gas pathway 1008 from gas flow, the diaphragm 1006 is deflected toward a baffle 1024 positioned in the waste gas pathway 1008 and sealingly engages with the baffle 1024 so as to block off a pathway 1026 between the diaphragm and the baffle. To open the waste gas pathway 1008, the diaphragm 1006 is deflected away from the baffle 1024 so as to allow gas to flow through the pathway 1026 and out the exhaust. It will be appreciated that the pathway 1026 controlled by the diaphragm 1006 provides a much larger flow capacity for waste gas than the orifices in the solenoid valves.

Please amend Paragraph [0058] of the specification as follows:

[0058] In operation, pressurized purge gas 1028 from the adsorbent column flows into the opening 1022 in the upper plate 802 and pushes the diaphragm 1006 away from the baffle 1024 so as to open the path 1026 between the diaphragm 1006 and the baffle 1024 for gas flow. After the purge gas is released through the exhaust, a portion of the feed gas is directed into the air chamber 1004 via the solenoid valve 1002 to push the diaphragm against the baffle 1024 so as to close the path 1026 therebetween. Advantageously, the piloted valve system ~~100~~ 1000 allows waste gas to be released from the column through a much larger opening than the orifices contained in the solenoid valves and does not consume additional space as the valves are all incorporated in the manifold.

Please amend Paragraph [0059] of the specification as follows:

[0059] Figure 11 provides a detailed view of the components inside the second compartment 302 of the housing 206. As shown in Figure 11, the second compartment 302 generally contains an air circulation fan 1102, a battery 1104, and a compressor assembly 1106. In one embodiment, the fan 1102 comprises a blower or other device used for forcing air circulation. The battery 1104 is preferably a lithium ion battery having a rated life of at least 2

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hours. In certain embodiments, the battery may also comprise a fuel cell or other transportable electric power storage device. The compressor assembly 1106 includes a compressor 1108, a driving motor 1110, and a heat exchanger 1112. In one embodiment, the compressor 1108 is preferably a non-reciprocating compressor such as a scroll compressor or a radial compressor and the motor 1110 is preferably a DC brushless motor. In certain embodiments, the compressor 1108 can also be a vacuum pump or a combination of a vacuum pump and a compressor. The heat exchanger 1112 can be in the form of aluminum coiled tubes or other common heat exchanger designs. In one embodiment, the heat exchanger 1112 has an inlet 1114 and an outlet 1116. The inlet 1114 is in fluid communication with the compressor 1108 for receiving feed gas therefrom and the outlet 1116 is connected to the PSA unit for delivery of feed gas thereto.

Please amend Paragraph [0065] of the specification as follows:

[0065] As also shown in Figure 13, a circuit board 1314 is mounted horizontally on the PSA unit 506, above the valves 816 on the manifold 512. The circuit board 1314 comprises control circuitry which governs the operation of the PSA unit, alarms, power management system, and other features of the apparatus. As described above, contacts on the circuit board 1314 are in direct electrical contact with mating contacts 516 on the valves 514 of the PSA unit 506, which conserves space and eliminates the need for wiring connections. In one embodiment, the circuit board ~~1413~~ 1314 has small through-hole connectors that align with the location of valve pins to establish electrical interconnection.

Please amend Paragraph [0067] of the specification as follows:

[0067] Figure 14 schematically illustrates a thermal management system of another preferred embodiment, which is configured to provide a continuous flow of cooling air across the components inside the housing. As shown in Figure 14, ambient air 1402 is drawn into the housing 206 through an air inlet 1404 by the fan 1102. The air inlet 1404 is preferably located in a lower portion of the sidewall 212c adjacent the first compartment 300. The ambient air 1402 is directed to flow through an air flow passageway 1406 generally defined by the walls of the housing and the components therein. The air flow passageway 1406 is preferably a circuitous path extending from the air inlet 1404, through the first and second compartments 300, 302, to an air outlet 1408 located in a lower portion of the sidewall 212a adjacent the second compartment 302. Preferably, the ambient air is directed to flow across the first compartment, which contains

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temperature sensitive components, before entering the second compartment which contains heat generating components. As will be described in greater detail below, the thermal management system utilizes the air circulation fan 1102 in combination with the configuration of the housing and placement of components therein to produce a one-way flow passageway for air from inlet to outlet. As such, heated air is not re-circulated back into the system and the components are cooled by a continuous stream of external air.

Please amend Paragraph [0069] of the specification as follows:

[0069] As also shown in Figure 14, the fan ~~112~~ 1102 is located in the downstream portion 1410 of the air flow passageway 1406 immediately above the compressor assembly 1106. The fan ~~112~~ 1102 generates a downward air stream directly against the compressor assembly 1106 to facilitate heat dissipation of the heat exchanger and compressor. The air stream flows past the compressor assembly 1106 through the downstream portion 1410 of the air passageway 1406 and exits the housing 206 through the air outlet 1408. The fan 1102 is advantageously positioned to focus a cooling air stream directly on the heat generating components inside the housing. Moreover, portions of the air stream warmed by the compressor assembly are not re-circulated inside the housing, which substantially minimizes increases in the ambient temperature therein and improves cooling efficiency. The air stream generated by the fan 1102 creates a negative pressure in the upstream portion of the passageway 1406, which draws ambient air through the passageway 1406 from the first compartment 300 to the second compartment 302 as shown in Figure 14. Although some turbulence of the air may occur downstream of the fan, the air path configuration permits substantially one way air flow along the path between the intake and the fan.

Please amend Paragraph [0071] of the specification as follows:

[0071] Figure 15 schematically illustrates the manner in which intake air 1500 is processed through the components of the apparatus. As shown in Figure 15, intake air 1500 is drawn through the air intake 502, through the air filter 504 into an inlet port 1404 of the compressor 1108. Air is preferably drawn into the compressor air intake at a flow rate of no greater than about 15 slpm so as to maintain a low noise level and low power consumption throughout the system. The air is pressurized by the compressor 1108 and delivered to the heat exchanger 1112 through the compressor outlet 1406. The pressurized air is cooled by the heat

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exchanger 1112 and then supplied as feed gas to the PSA unit 506. Feed gas is directed through the inlet port 812 of the PSA unit 506, into adsorbent columns 508a-b to produce a product gas in accordance with a PSA cycle, preferably the six step/two bed cycle described above. Product gas from the adsorbent columns 508a-b flows into the storage column and is delivered to the ~~patent~~ patient through an outlet port 1408 in the manifold 512 connected to the storage column. Preferably, the product gas is delivered to the patient at a flow rate of between about 150 ml/minute and 750 ml/minute and having an oxygen concentration of at least 87%, more preferably between 87%-93%.

Please amend Paragraph [0072] of the specification as follows:

[0072] Figure 16A shows the apparatus as fully assembled in the form of a portable oxygen concentrator unit 1600. The unit 1600, including the housing and components therein, has a combined weight of preferably no more than about 10 pounds and produces a noise level of no greater than about 45 dB external to the unit. As shown in Figure 16A, an air scoop 1602 is integrally formed in the sidewall 212 c of the shell 204 adjacent the air outlet 1408 to channel air flow out of the housing 206. A similar air scoop is also formed in the sidewall adjacent the air inlet (not shown) to channel ambient air into the housing. As described above, the sidewalls 212a, c of the housing have a curved configuration so as to discourage users from resting the housing against the sidewall, which can block the air inlet or outlet.

Please amend Paragraph [0074] of the specification as follows:

[0074] As also shown in Figure 16A, a user interface panel ~~1602~~ 1603 containing a plurality of system controls 1604 such as flow rate and on-off switches is integrally formed in the shell 204. In some embodiments, an I/O port 1606 is preferably formed in the user interface panel 1602. The I/O port allows data transfer from the unit to be performed simply by using a complementary device such as a palm desktop assistant (PDA) or laptop computer. Moreover, an in-line filter system 1608 is also formed in the shell 204 to filter product flow in line prior to delivery to the patient. As will be described in detail below, the in-line filter system 1608 is integrated in the shell 206 of the unit so as to provide easy access to the filter without requiring opening of the shell.

Please amend Paragraph [0074] of the specification as follows:

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[0074] As shown in Figure 16B, the in-line filter system 1608 includes an annular chamber 1610 formed in the shell 204 and a fitting 1612 that engages with the chamber 1610 from outside of the shell. The chamber 1610 has a seat portion ~~1612~~ 1613 configured to receive a disk filter 1614 and a threaded portion 1616 configured to engage with the fitting 1612. Preferably, the chamber 1610 is molded into the shell 204 and oxygen product inside the housing is ported to the chamber. In one embodiment, the disk filter 1614, preferably a 10 micron or finer filter, is held in compression in the seat portion 1612 of the chamber by the fitting 1612, which threadably engages with the chamber 1610 from outside of the shell. In another embodiment, the fitting 1612 also contains a hose barb 1618 used to connect the cannula. Advantageously, the disk filter 1614 can be serviced by simply unscrewing the fitting 1612, replacing the filter 1614, and then re-screwing the fitting 1612 without ever having to open the housing of the unit. As shown in Figure 16C, the unit 1600 also includes a removable hatch 1620 that provides simplified access to the circuit board 1314 inside the housing 206 and the internal connections to the oxygen product line and power input.

Please amend Paragraph [0076] of the specification as follows:

[0076] The satellite conserver 1700 is configured to substantially remove the constraint imposed by the short tube requirement and allow users the freedom to move in a much larger area around the portable concentrator. As shown in Figure 17, the satellite conserver 1700 includes a small, lightweight conserving device 1702 for delivering oxygen rich product gas to users in metered amounts in a known manner in response to sensed breath. The conserver 1700 includes a breather sensor 1701 for sensing the user's breath and a delivery valve 1703 for delivering oxygen to the user. In one embodiment, the conserving device 1702 utilizes a breath rate algorithm that delivers a nearly constant amount of oxygen per minute, regardless of the breath rate of the patient. As such, patients who take more breaths within a ~~give~~ given time period receive the same amount of oxygen as those who take less breaths. In another embodiment, the conserving device adjusts the bolus volume based on the flow setting rather than the breathing rate. In yet another embodiment, the conserving device 1702 can be fit with a second pressure sensor, which detects the pressure in the input line from the concentrator. The delivery valve timing can be adjusted based on the sensed pressure at the end of the input line

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such that a higher pressure corresponds to a shorter valve open time and a lower pressure corresponds to a longer valve open time.

Please amend Paragraph [0077] of the specification as follows:

[0077] As also shown in Figure 17, the conserving device 1702 is adapted to be worn by the user or positioned adjacent to the user so that breath sensing functions can be performed proximate to the user even if the concentrator unit is far away. Thus, the sensitivity of the breath sensor is not compromised even if the user is far away from the unit. The satellite conserver 1700 further includes flexible tubing 1704 connecting the conserving device 1702 to the hose barb fitting ~~1612~~ 1618 on the concentrator 1600. In one embodiment, the tubing 1704 is preferably between 50 to 100 feet, which provides users a much greater radius of mobility. When the satellite conserver 1700 is in use, the breath detector mounted inside the housing of the concentrator is disabled. As also shown in Figure 17, the satellite conserver can be worn on the person by a clip 1706 attached to the conserving device 1702. The satellite conserver advantageously permits the user to move around the vicinity of the concentrator, preferably in at least a 50 to 100 feet radius, without detracting from the efficacy of the unit.

Please amend Paragraph [0079] of the specification as follows:

[0079] As also shown in Figure 18A, the mobility cart 1800 further includes an on-board power supply 1818 that is attached to the frame 1802 portion. Preferably, the power supply 1818 has an AC power input and is adapted to power charging terminals fitted in each battery slot 1812 and a terminal fitted in the compartment for charging the battery within the concentrator. In one embodiment, the cart also has an adapter plug 1820 that extends from the power supply 1818 and mates with the concentrator's DC power input jack. The power supply ~~1816~~ 1818 is preferably sufficient to power both battery chargers while simultaneously powering the concentrator unit and charging the battery mounted inside the unit. Each battery preferably has a rated life of at least 2 hours so that the user is able to enjoy continuous use of the concentrator unit for at least six hours without an external power source. In one embodiment, the power supply is cooled by a fan mounted on the frame portion 1802. In another embodiment, the frame portion has recesses through which water may drain out without damaging the parts. The cart 1800 can further comprise an integrated power cord and/or retractable power cord that is adapted to be plugged into a wall.

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Please amend Paragraph [0080] of the specification as follows:

[0080] Figure 18B illustrates the manner in which the oxygen concentrator 1600 and spare batteries 1822 are positioned in the mobility cart. As also shown in Figure 18B, the handle 1808 has two telescoping rails that can be extended and retracted. When the handle 1808 is in the fully retracted position as shown in Figure 18B, the mobility cart 1800 preferably has a height of about 14-18 inches and can be stored in a small area such as under an airplane seat. In one embodiment, the mobility cart is structured such that the concentrator, when sitting in the cart, interfaces closely with seals positioned on the frame of the cart at the air intake and exhaust ports. As such, airflow coming into or out of the concentrator actually travels through the frame in some manner, adding extra sound attenuation by increasing the tortuosity of the flow path. Moreover, an auxiliary fan or blower mounted in the cart can also be used to circulate this air further. Advantageously, the mobility cart has integrated battery chargers and power supply incorporated in one unit so as to obviate the need for users to pack power supplies or external chargers when traveling with their concentrator. Moreover, the cart provides a single compact unit in which all oxygen concentrator related parts can be transported, which allows users greater ease of mobility when traveling.